MICHIGAN

FOREST PEST DETECTION PROGRAM

REPORT FOR 1964

COMPILED BY:

FORESTRY SECTION, MICHIGAN DEPARTMENT OF CONSERVATION

COOPERATORS:

STATE DEPARTMENT OF AGRICULTURE, U. S. FOREST SERVICE, MICHIGAN STATE UNIVERSITY, UNIVERSITY OF MICHIGAN, PRIVATE FOREST INDUSTRY

TABLE OF CONTENTS

	Page
Introduction	ii
Organization of Program	1
Program Activities	2
Cooperators' Reports	3
Observation Reports	4
Critical Insects	4
Other Important Insects	17
Diseases	20
Other Conditions	23
Summary	24

Cover: White grubs, the most important pest of newly planted forest plantations in Michigan.

INTRODUCTION

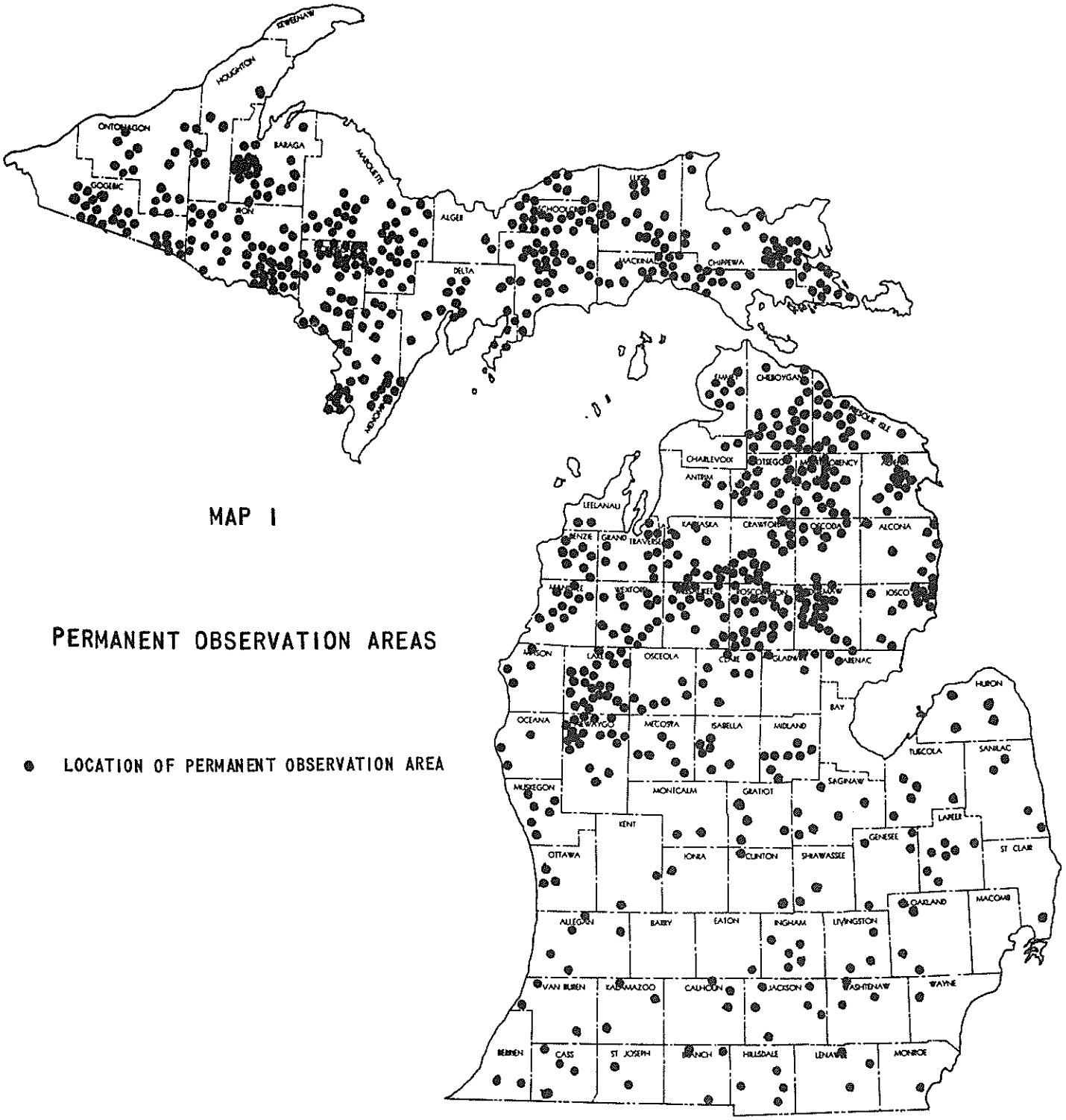
Forest pest problems in Michigan are of concern to many people and agencies, both as land owners and as charged with surveys, control and regulatory measures. Thus, the Michigan Forest Pest Detection Program operates through the cooperation of various individuals and agencies, including: Forestry Section, Michigan Department of Conservation; Plant Industry Division, Michigan Department of Agriculture; U. S. Forest Service; Lake States Forest Experiment Station; Departments of Forestry, Entomology, and Botany and Plant Pathology, Michigan State University; School of Natural Resources, The University of Michigan; and private industry. Each agency contributes in its respective field: Survey, control, identification, or research.

Coordination of surveys and exchange of information with neighboring states is an important activity of the program. This is done through correspondence and at the Lake States Forest Insect Work Conference held in September, 1964 at Drummond, Wisconsin.

The annual meeting of the Michigan Forest Pest Detection Program Committee was held January 20, 1965 in Lansing to review the work carried on during 1964 by the various agencies concerned with surveys, control and research, to discuss the annual report, and to make plans for 1965. Those in attendance were:

L. E. Bell, Department of Forestry, Michigan State University
C. T. Black, Game Section, Michigan Department of Conservation
A. W. Bloomer, Plant Industry Div., Michigan Dept. of Agriculture
J. W. Butcher, Department of Entomology, M.S.U.
R. B. Carlson, Department of Entomology, M.S.U.
J. B. Cody, Kimberly-Clark Corporation
A. C. Dowdy, Department of Entomology, M.S.U.
P. R. Flink, Forestry Section, Michigan Dept. of Conservation
L. Gardner, Plant Industry Div., Michigan Dept. of Agriculture
S. A. Graham, School of Natural Resources, University of Michigan
M. K. Hanna, Plant Industry Div., Michigan Dept. of Agriculture
F. B. Knight, School of Natural Resources, U. of M.
J. R. Maki, Department of Entomology, M.S.U.
H. C. Martin, Plant Industry Div., Michigan Dept. of Agriculture
N. G. Sperhake, Kimberly-Clark Corporation
F. C. Strong, Botany and Plant Pathology Dept., M.S.U.
D. O. VanDenburg, Regional Office, U. S. Forest Service
W. J. Young, Laboratory Div., Michigan Dept. of Agriculture

The following report of activities of the Michigan Forest Pest Detection Program for 1964 was compiled by the Forestry Section of the Michigan Department of Conservation. Pest information for federal lands was obtained in part from the forest pest situation reports from the National Forests.



MAP I

PERMANENT OBSERVATION AREAS

● LOCATION OF PERMANENT OBSERVATION AREA

ORGANIZATION OF PROGRAM

The successful reduction in wood losses caused by forest fires, by the use of organized detection and suppression methods, focused attention on other causes of wood losses and means of reducing them. Fire, the once great destroyer of forests, has been reduced to a subordinate position behind diseases and insects. However, it must be remembered that the great potential for destruction is still present and only through continued efforts can fire losses be kept at a minimum.

Disease and insects, although not as spectacular as fire, and needing different methods for detection and suppression, nevertheless destroy tremendous numbers of trees and forest products. With this thought in mind, a forest pest detection program was outlined and organized in 1950 by the Conservation Department, with the cooperation of the U.S. Bureau of Entomology and Plant Quarantine (now the Division of Forest Insect Research, U.S. Forest Service); the U.S. Forest Service; the School of Natural Resources, University of Michigan; the Departments of Entomology, and Botany and Plant Pathology, and Forestry Extension Service, Michigan State University; and the Division of Plant Industry, State Department of Agriculture.

The objectives of the program are: (1) To detect the presence of forest insects and diseases, and to apprehend outbreaks by systematically and annually collecting records of occurrence and damage; (2) to facilitate and organize direct control in case of emergency; (3) to provide a basis for protective measures by indirect means; and (4) to provide forest land owners and managers, through the use of newspapers, reports and memoranda, up-to-date information on the status of the important forest pests.

The detection framework is built principally around the field organization of the Forestry Section of the Conservation Department, which handles state and private lands, and the U.S. Forest Service which handles federal lands. The general field plans for insects, insofar as the State Forest Division districts are concerned, calls for the establishment of permanent observation areas scattered throughout each forest district on both state and private lands in timber stands where critical insects exist or are likely to exist. (See Map I). The observation areas are permanent to the extent that the trees remain susceptible to the critical insects. After the trees on an area reach a size no longer seriously affected by certain critical insects, the observation area may be replaced by one with a younger, more susceptible forest stand. The observation area usually consists of all of the susceptible forest type on a 40 acre description and therefore may vary in size from a few acres to forty acres.

Observations are submitted on report forms annually to the Lansing Office of the Forestry Section, indicating the degree of infestation, or the absence, of each of the critical insects on the designated observation areas. Those critical insects found only in the southern part of the state are not reported on in the northern regions, and vice versa. Thus, each district forester has only six or eight critical insects to observe.

However, foresters are requested to report the presence of any insect observed on the areas that might become important or that has not previously been found in their area.

The two educational institutions participate in training programs and act in an advisory capacity on insect and disease identification and control measures, as does also the Division of Forest Insect Research of the U.S. Forest Service.

The State Department of Agriculture, through its Division of Plant Industry, is directly concerned in the program by virtue of its statutory authority to establish quarantines, to enter on private lands for purposes of inspection and, where necessary, to compel or provide for the control of serious insect pests and contagious plant diseases.

The disease phase of the program does not follow the same routine as applied to insects, since there are relatively few "critical" forest diseases requiring constant surveillance. Individual programs have been developed for the most important diseases with various state and federal agencies cooperating in survey and control work.

* * *

PROGRAM ACTIVITIES

INFORMATION RELEASES

During the field season, informational releases in the form of general memoranda were issued to all cooperators to keep them up-to-date on the current forest pest situation, unusual conditions in their areas, new pests, time for control applications or other important information. In this way information was sent out while it was still timely.

COOPERATIVE REPORTS

The Michigan Forest Pest Detection Program helps to provide information for other cooperative reports as follows:

Weekly Insect Report - Michigan State University - A weekly report of the current insect situation was initiated by the Department of Entomology, Michigan State University, in 1963, including all types of important insect pests, in addition to forest insects. Other features of the report are the maps of the previous week's temperatures, precipitation and other weather data and how it relates to insects. Information on insect conditions gained through the Michigan Forest Pest Detection Program is forwarded to Michigan State University for inclusion in these weekly reports.

Cooperative Economic Insect Report - Information for the above report is forwarded by Michigan State University to the Plant Pest Control Division, Agricultural Service, U.S. Department of Agriculture, for inclusion in the Cooperative Economic Insect Report. This report is a weekly resume of important insects in the United States and includes a section on forest insects.

Annual Regional Report on Forest Insect and Disease Conditions - Region 9, U.S.F.S. - Annually the forest pest situation in the Lake States is summarized by the U.S. Forest Service Regional Office in Milwaukee, Wisconsin, from information submitted by the states and also collected by the Forest Service. Periodically during the summer, summaries of the forest pest situation in Michigan are forwarded to the U.S. Forest Service Regional Office for inclusion in their reports.

Status Report on Forest Insect Conditions - The information compiled in the previously mentioned report by the U.S. Forest Service in Region 9 is included in the "Status Report of the Forest Insect Conditions" covering the United States and published annually by the Division of Forest Insect Research, Forest Service, U.S. Department of Agriculture in Washington, D.C.

* * *

COOPERATORS' REPORTS

Cooperators aid in the detection program by reporting on insect conditions in areas not covered by state foresters, thus helping to present a better overall picture of the forest insect situation in the state. This cooperation takes the form of reporting on permanent observation areas, helping with special surveys, and/or reporting by letter insect conditions that come to their attention.

Many companies and agencies have contributed to the detection program at various times in the past and are expected to in the future when important pests threaten forests under their jurisdiction. The following cooperators submitted reports or observations during 1964:

Abitibi Corporation
Consumers Power Company
Kimberly-Clark Corporation
Michigan State University
North American Timber Co., Packaging Corporation of America
Oliver Iron Mining Division, U. S. Steel Corporation
Plant Industry Division, Michigan Department of Agriculture
U. S. Forest Service
The University of Michigan

* * *

OBSERVATION REPORTS

A total of 1,820 observation reports was received and analyzed by the Lansing office of the Forestry Section. Of this total 1,723 were on the critical insects.

Over a period of several years, there had been a gradual decline in the number of observation areas and the number of observation reports submitted. Many of the areas were dropped as unsuitable and not replaced due to the anticipated reorganization within the Conservation Department and subsequent changing of district boundaries.

The field organization of the Forestry Section has been completed and the state divided into 37 forest areas. All observation areas will be checked for suitability during the summer of 1965 and those not suitable will be dropped, and in some cases new areas established to replace them.

A thorough revision of the pest program is being made, including revision of the observation report form and dropping of reporting of insects such as the forest tent caterpillar and larch sawfly on the observation areas. Insects not reported through the regular observation reports will be included in a monthly summary of the insect situation on each forest area.

Details of the revision will be included in the 1965 Annual Report.

* * *

CRITICAL INSECTS

During 1964 observation reports were made on the following insects:

Insect	Area Reporting (1 Upper Peninsula, 2 Northern Lower Michigan, 3 Southern Lower Michigan)
European pine sawfly	3
European pine shoot moth	2,3
Forest tent caterpillar	1,2
Saratoga spittlebug	1,2
Anomala beetle	2
Jack pine budworm	1,2
Spruce budworm	1
Larch sawfly	1,2
White pine weevil	1,2,3
Red-headed pine sawfly	1,2

Following are reports of critical insects for 1964:

JACK PINE BUDWORM - Choristoneura pinus Free.

Widespread defoliation of jack pine in the north central and northeastern portions of Lower Michigan occurred in 1964. The outbreak encompassed a much larger area than the previous year, but generally the trees were less severely defoliated. In 1963, old and new foliage was eaten, while in 1964, only the new foliage was consumed.

During June, surveys were conducted in stands heavily attacked in 1963 and which would not withstand another year of defoliation without suffering tree mortality. Results of the surveys indicated that only low populations were present and control measures would not be necessary. The low populations were due, at least in part, to the almost complete absence of staminate flowers on the trees that had been severely attacked the previous summer. Within these stands, many trees had escaped severe defoliation during 1963 and generally these trees bore a heavy crop of staminate cones and had a correspondingly high budworm population.

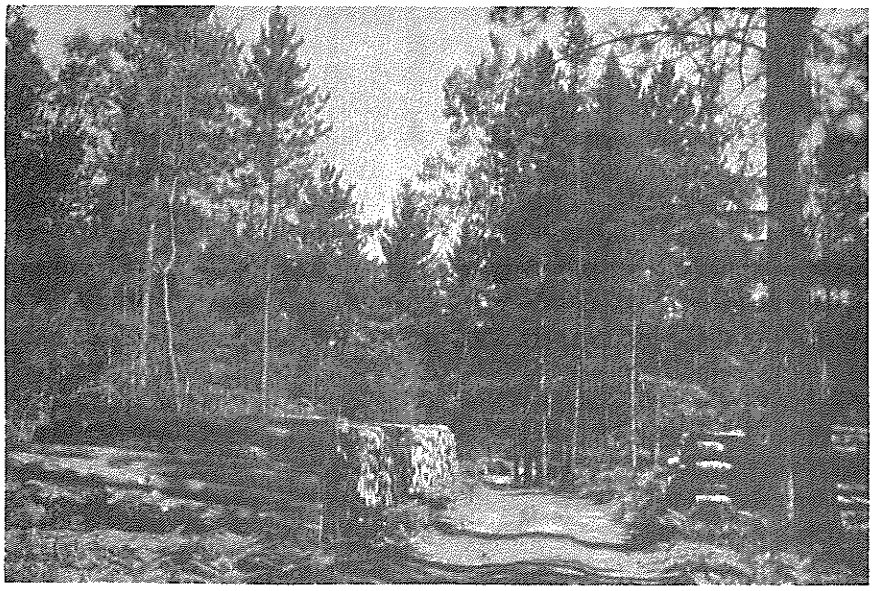
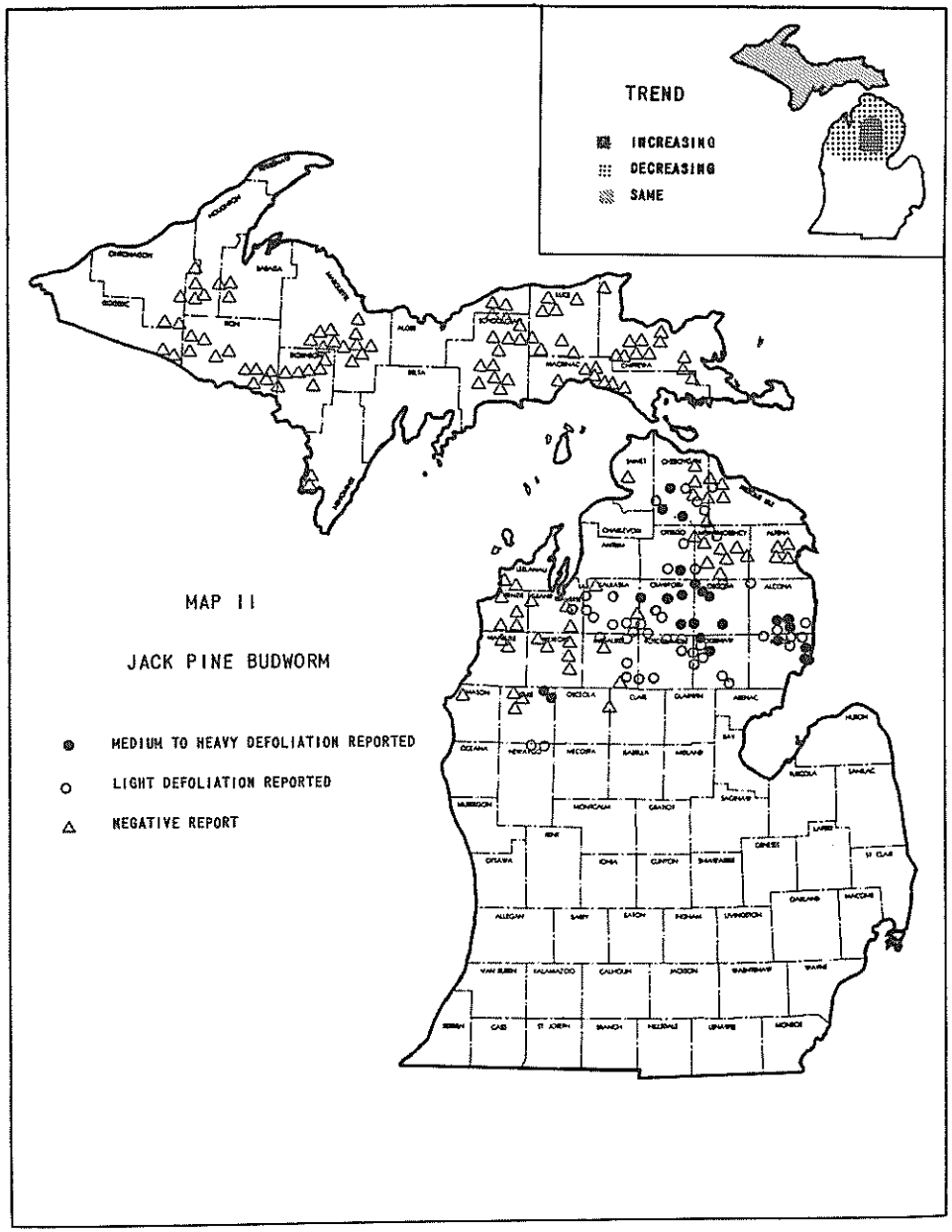


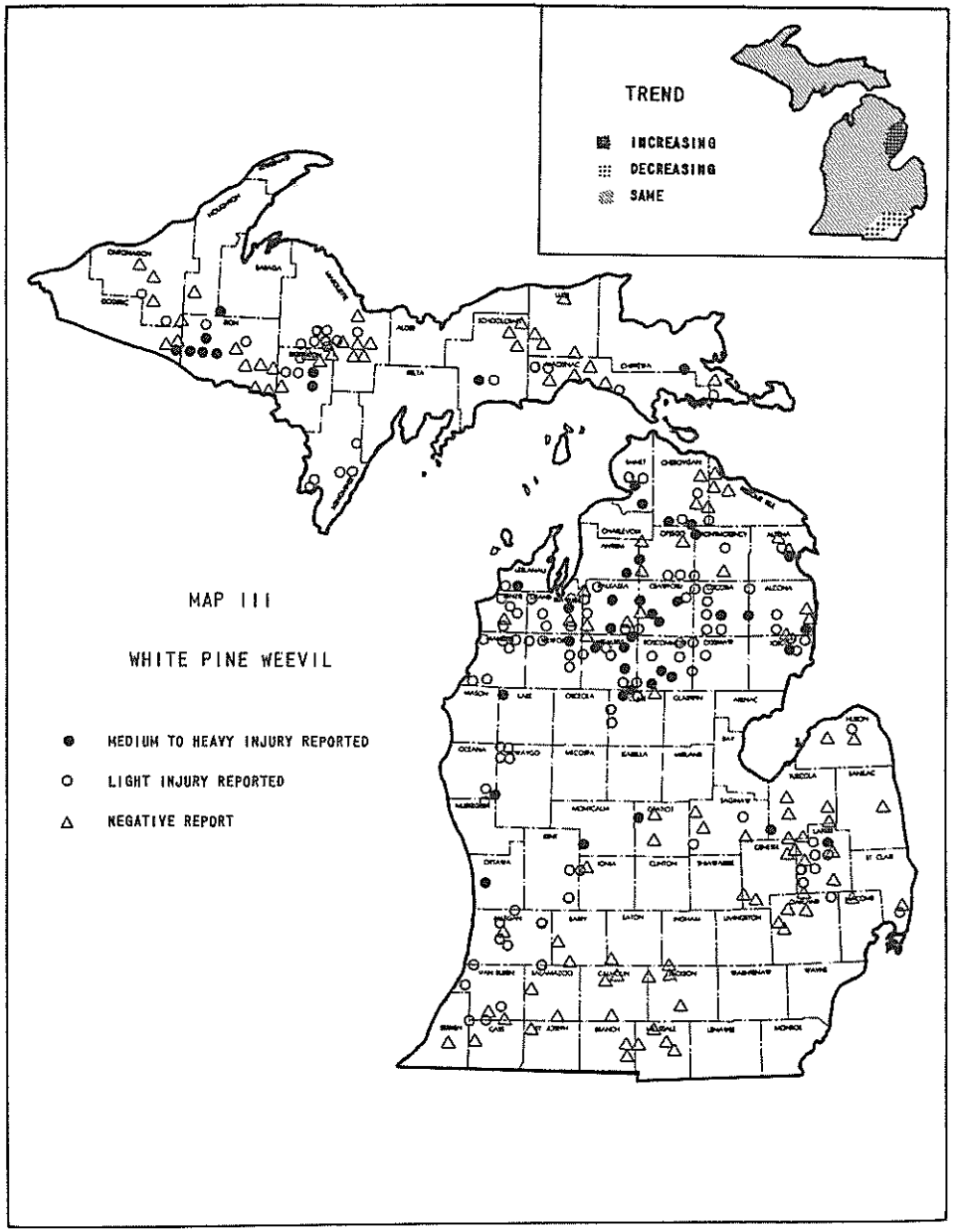
Figure 1.

Forest management offers the most permanent method of reducing insect and disease losses.

Some jack pine trees died in northwest Ogemaw County as a result of the 1963 defoliation. Undoubtedly, the extremely dry soil conditions played a major part as a contributing factor in the tree mortality. Elsewhere, no appreciable mortality occurred following the 1963 defoliation. The effects of the 1964 defoliation in regards to tree mortality cannot be assessed until the summer of 1965.

In general, there was widespread defoliation in 1964 in the following counties: Northeastern Roscommon, northwestern Ogemaw, northern Iosco, southern Alcona, Oscoda, Crawford, southeastern Otsego, southwestern Montmorency, and southeastern Cheboygan.


TREND
INCREASING
DECREASING
SAME
MAP II
JACK PINE BUDWORM
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT


TREND
INCREASING
DECREASING
SAME
MAP III
WHITE PINE WEEVIL
MEDIUM TO HEAVY INJURY REPORTED
LIGHT INJURY REPORTED
NEGATIVE REPORT

No reports were received of budworm infestations in the Upper Peninsula.

On the Lower Michigan National Forests, budworm populations declined on the Manistee National Forest and increased in area on the Huron National Forest. Egg surveys indicate that high populations will be forthcoming in 1965 unless natural mortality occurs, and control has been recommended on part of the area.

Reports from the observation areas showed a considerable increase in the number of positive reports and those indicating defoliation over 60 percent. Medium to heavy defoliation was reported on observation areas in Lake, Ogemaw, Iosco, Alcona, Oscoda, Crawford, Otsego and Cheboygan counties. All reports from the Upper Peninsula indicated no defoliation during 1964. (See Map II)

Summary of Reports

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Total.....	185	232	280	291	276	267	269	246	244	301	247	243	244
% Positive...	40	32	20	20	29	22	19	14	11	28	28	18	32

Breakdown of 1964 Reports

Heavy defoliation (61-100%).....10.....(13%)
Medium defoliation (21-60%).....15.....(19%)
Light defoliation (1-20%).....53.....(68%)

WHITE PINE WEEVIL - Pissodes strobi (Peck)

Deformity of jack, white, Scotch and red pines, as well as Norway spruce continues to be a perennial problem throughout most of Michigan, except for a few counties in the extreme southeastern section. Damage to red pine is becoming more prevalent. For some as yet unknown reason, jack pine plantations in Lower Michigan have a higher percentage of trees attacked than similarly aged plantations in the Upper Peninsula.

Weevil damage is greatest in the northern half of Lower Michigan. This is also the area of the greatest concentration of plantations of susceptible size.

Reports from the observation areas remain about the same each year as regards to the percent of positive reports and the average degree of infestation.

Control projects on state land were with back pack sprayers used to spray the terminal leaders in jack pine plantations. Plantations treated were generally about three to five feet in height and had about 10 percent of the trees weevilled the previous year. Experience has shown that if these plantations were not treated, weevilling of 20 to 25 percent could be expected. Spraying the leaders with DDT reduces the incidence of weevil damage to less than one percent.

In past years, control on state land has been by the use of Conservation Corrections inmate crews, as it was in 1964 in Manistee and Grand Traverse counties on the Fife Lake State Forest. Jack pine on 64 acres was sprayed.

On the Pigeon River State Forest hired crews were used to spray jack pine on 415 acres in Otsego County. A total of 625 hours were needed to complete the operation. This includes supervision and travel time. Including the cost of the insecticide, the cost per acre was $2.93. Surveys in the treated stands indicated that the spraying had kept the weevil damage to less than one percent.

It is expected that the white pine weevil will continue to be a problem wherever pines or Norway spruce grow in open plantations.

Reports of over 10 percent weevilling were received from most counties in the Upper Peninsula and northern Lower Michigan. Heavy injury of over 40 percent was reported from observation areas in Emmet, Cheboygan, Otsego, Antrim, Ogemaw, Gratiot and Allegan counties. (See Map III)

Summary of Reports

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Total.....	33	231	278	319	306	317	335	333	306	385	339	329	339
% Positive...	64	65	59	60	53	56	62	58	62	59	56	61	57

Breakdown of 1964 Reports

Heavy injury (41-100% of leaders killed).....9.....(5%)
Medium injury (11-40% of leaders killed).....48.....(25%)
Light injury (1-10% of leaders killed).....135.....(70%)

EUROPEAN PINE SHOOT MOTH - Rhyacionia buoliana (Schiff.)

Populations of the European pine shoot moth remained at the low level of 1963. Much of the general decline in damage during the past eight years is due to a lower infestation in recently planted trees, and the general reduction in damage as the previously infested plantations outgrow the most susceptible size. (See Figure 2) Many plantations support small populations of the shoot moth, but due to the tree size and vigor, little permanent damage is done.

Heavy damage by the shoot moth was reported in Schoolcraft County in the Upper Peninsula, and Mason, Oceana, Lapeer, Genesee, Washtenaw and Monroe counties in Lower Michigan. Moderate damage was reported on observation areas in Newaygo, Oakland and Lapeer counties. (See Map IV)

The Forest Service reported that only one serious infestation is known on the Lower Michigan National Forests, and the infestation in Ontonagon County on the Ottawa National Forest in the Upper Peninsula has apparently died out.

Control

Control operations on state land have been limited to spraying in the nurseries to prevent infestation of the stock.

Summary of Reports

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Total.....	80	119*	203	207	258	242	229	225	238	269	249	219	224
% Positive...	40	47	39	49	42	48	51	52	44	48	52	40	35

*Increase due to inclusion of insect on critical list of districts in northern half of lower peninsula.

Breakdown of 1964 Reports

Heavy injury* .....8.....(10%)
Medium injury* .....3.....(4%)
Light injury* .....67.....(86%)

*Degree of injury = "I" = $\frac{\text{\% of susceptible trees attacked x \% of tips infested}}{100}$

Heavy if "I" is greater than 20
Medium if "I" is between 10 and 20
Light if "I" is less than 10

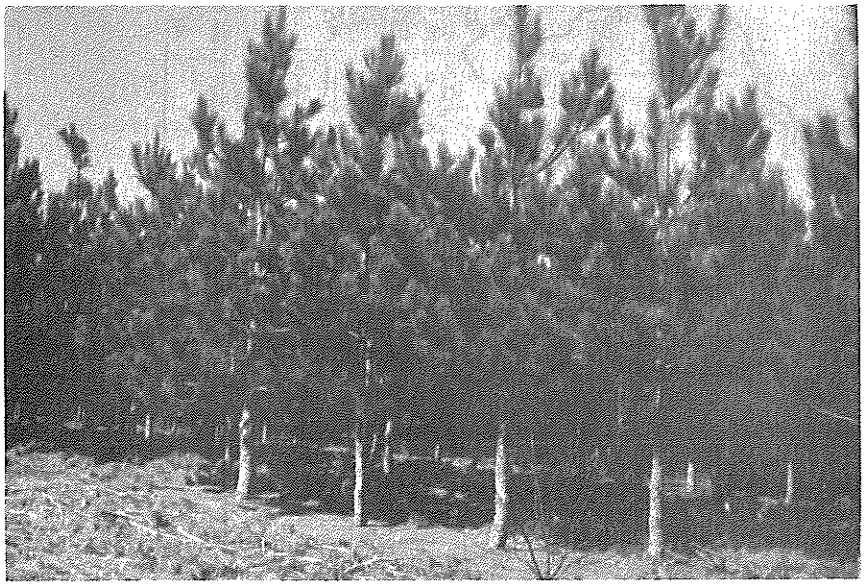
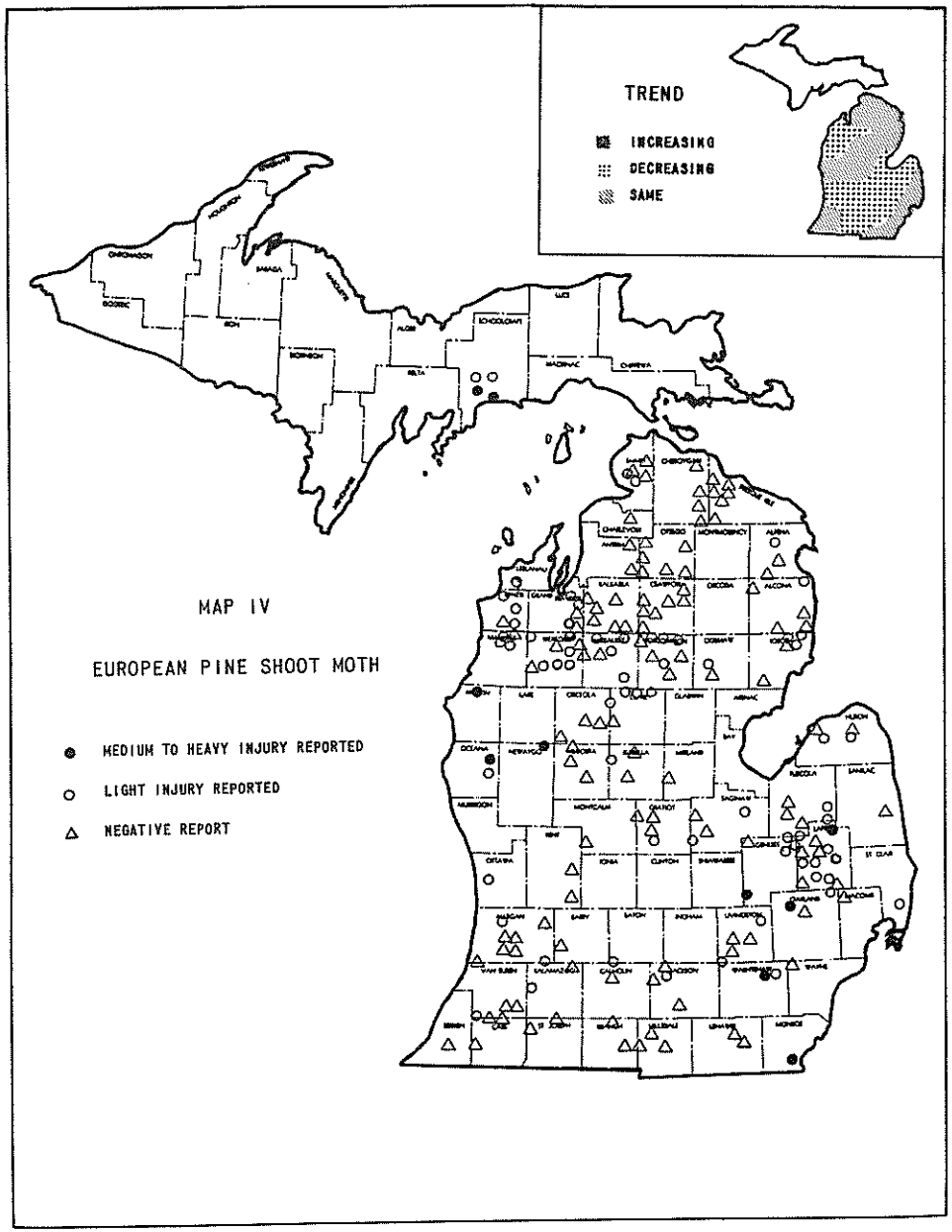
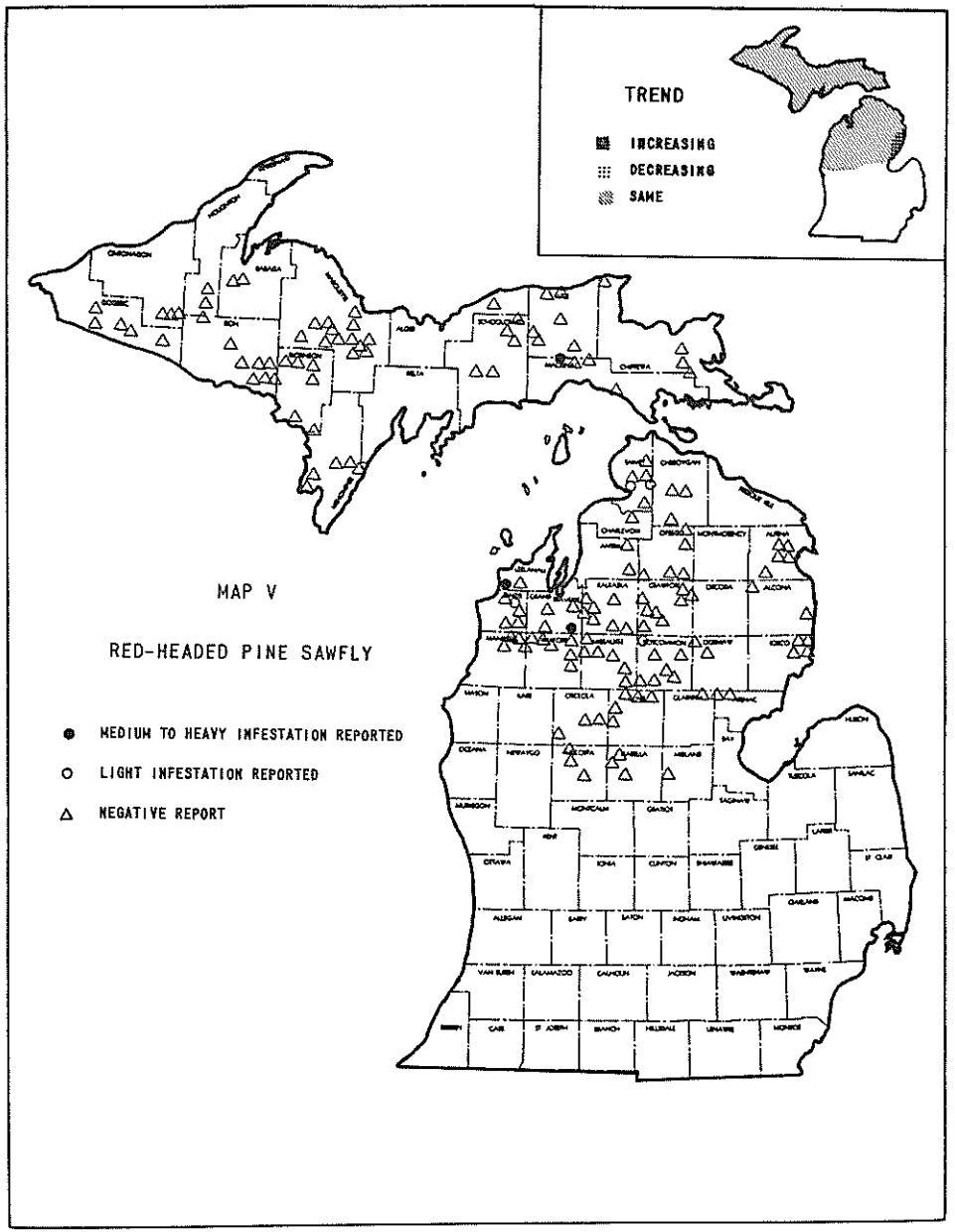


Figure 2.

Red pine plantation in Missaukee County, severely attacked by European pine shoot moth when younger, now outgrowing damage.


TREND
INCREASING
DECREASING
SAME
MAP IV
EUROPEAN PINE SHOOT MOTH
MEDIUM TO HEAVY INJURY REPORTED
LIGHT INJURY REPORTED
NEGATIVE REPORT


TREND
INCREASING
DECREASING
SAME
MAP V
RED-HEADED PINE SAWFLY
MEDIUM TO HEAVY INFESTATION REPORTED
LIGHT INFESTATION REPORTED
NEGATIVE REPORT

RED-HEADED PINE SAWFLY - Neodiprion lecontei (Fitch)

After remaining at a low level for several years, the red-headed pine sawfly is beginning to show signs of increasing activity. This may be the start of another period of high populations, and increased surveys will be made in 1965 to keep abreast of any population changes. The population increase was particularly evident in northeastern Iosco County and southeastern Alcona County, where colonies were present on 5 to 10 percent of the trees in 300 acres of young jack pine plantations.

On the Mackinac State Forest in Mackinac County sawfly populations were reported increasing in a plantation sprayed in 1959. Elsewhere, the U.S. Forest Service reported increasing activity in the Kenton and Watersmeet districts of the Ottawa National Forest and the Harrisville Ranger District on the Manistee National Forest.

In addition, light injury was reported from Emmet, Roscommon and Benzie counties, and medium defoliation from Grand Traverse and Leelanau counties, all in Lower Michigan. (See Map V).

There was no spraying on state land for control of the sawfly in 1964.

It is expected that if the sawfly continues to build up, some control measures may be necessary to prevent destruction of the young plantations. This need will be determined by egg and early larval surveys in June 1965.

Summary of Reports

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Total.....	173	231	230	260	255	239	249	233	248	284	258	226	219
% Positive...	7	8	8	5	5	16	14	18	9	7	3	2	4

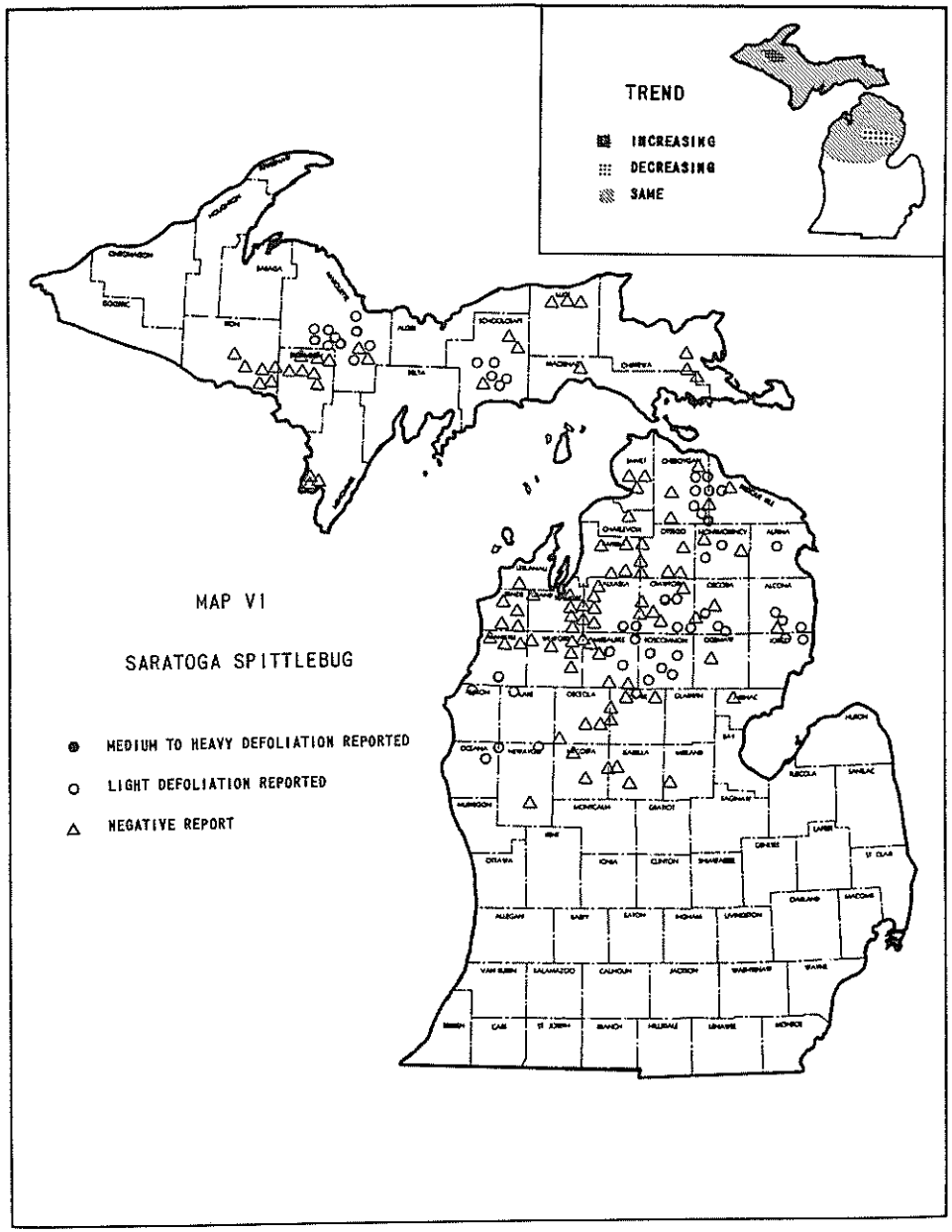
Breakdown of 1964 Reports

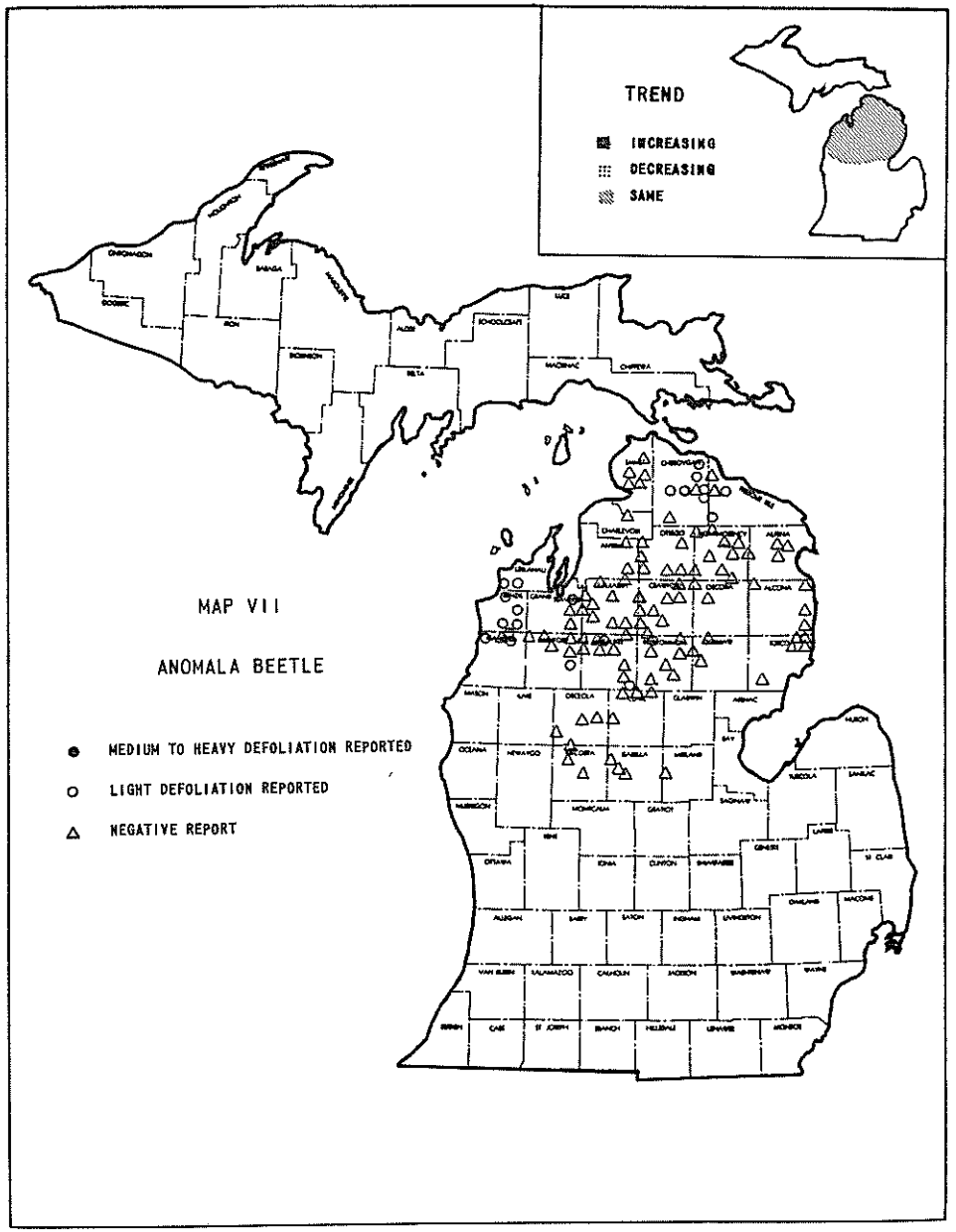
Heavy defoliation (11-100% susceptible trees attacked).....0.....(0%)
Medium defoliation (2-10% susceptible trees attacked).....2.....(25%)
Light defoliation (0-1% susceptible trees attacked).....6.....(75%)

SARATOGA SPITTLEBUG - Aphrophora saratogensis (Fitch)

Saratoga spittlebug populations generally declined slightly from the low levels of the previous two years. The major exception was 1,000 acres of pine plantations on the Mio Ranger District of the Huron National Forest. Plans have been made to initiate control measures if spring nymphal populations remain high.

Elsewhere throughout the state, spittlebug nymphs could be found in small numbers in many pine plantations where sweet fern grows in abundance.


TREND
INCREASING
DECREASING
SAME
MAP VI
SARATOGA SPITTLEBUG
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT


TREND
INCREASING
DECREASING
SAME
MAP VII
ANOMALA BEETLE
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT

There was a slight drop in the number of positive reports received from the observation areas, and there were no reports of moderate or heavy injury. (See Map VI.)

Pilot control studies were conducted by the U. S. Forest Service to find an effective substitute for DDT. The results are being analyzed by the Lake States Forest Experiment Station.

Summary of Reports

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Total.....	51	164	211	229	225	214	240	221	227	268	236	211	212
% Positive...	27	34	23	28	27	30	32	42	34	36	33	34	31

Breakdown of 1964 Reports

Heavy injury (61-100%).....0.....(0%)
Medium injury (21-60%).....0.....(0%)
Light injury (1-20%).....65.....(100%)

ANOMALA BEETLE - Anomala oblivia Horn

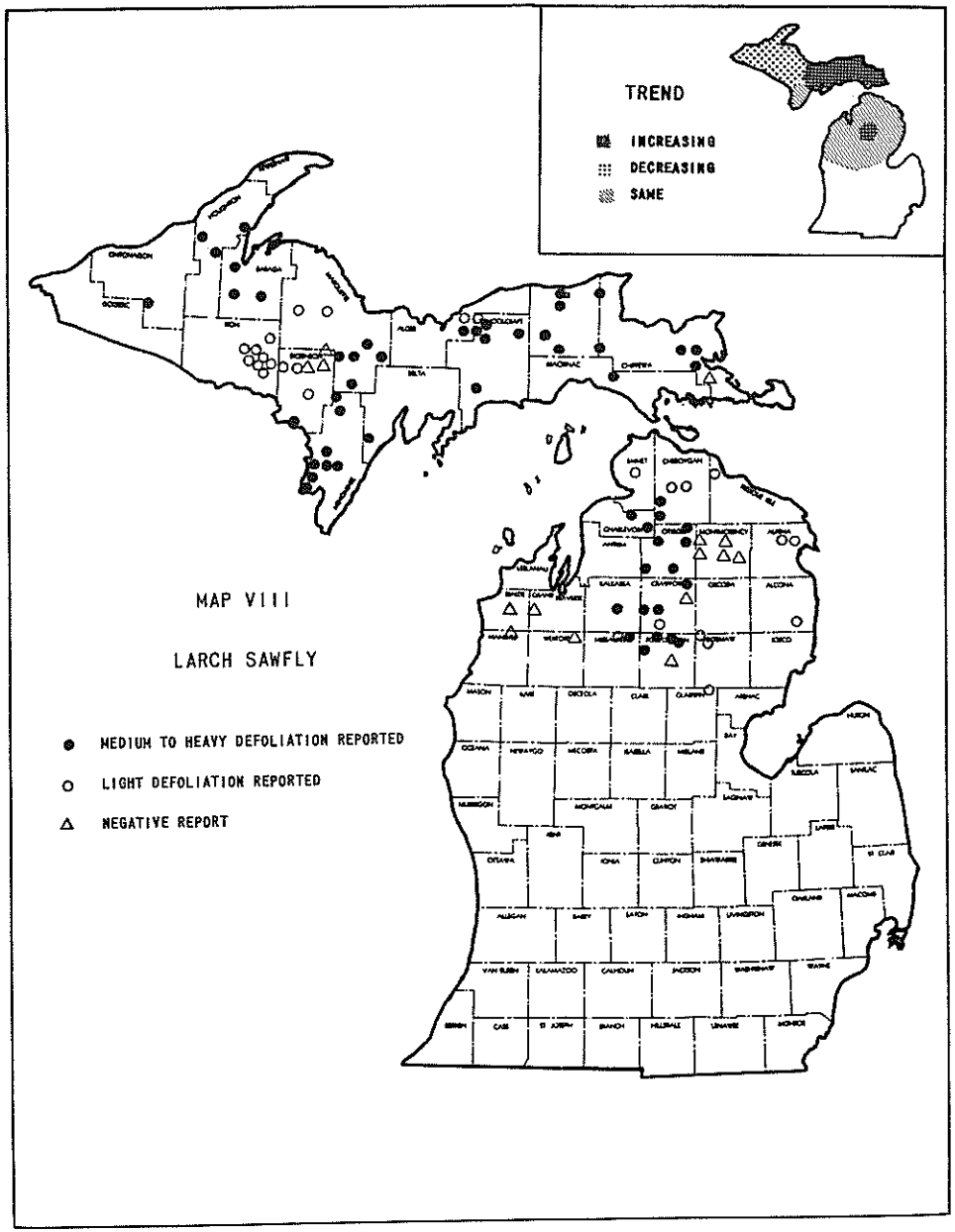
Anomala beetle populations continued to decline and caused less defoliation in northern Lower Michigan than in 1962 or 1963. No reports of over 20 percent defoliation were received from the observation areas. Reports of light defoliation were received from Cheboygan, Presque Isle, Leelanau, Benzie, Grand Traverse, Manistee, Wexford, Missaukee and Roscommon counties, all in northern Lower Michigan. (See Map VII.)

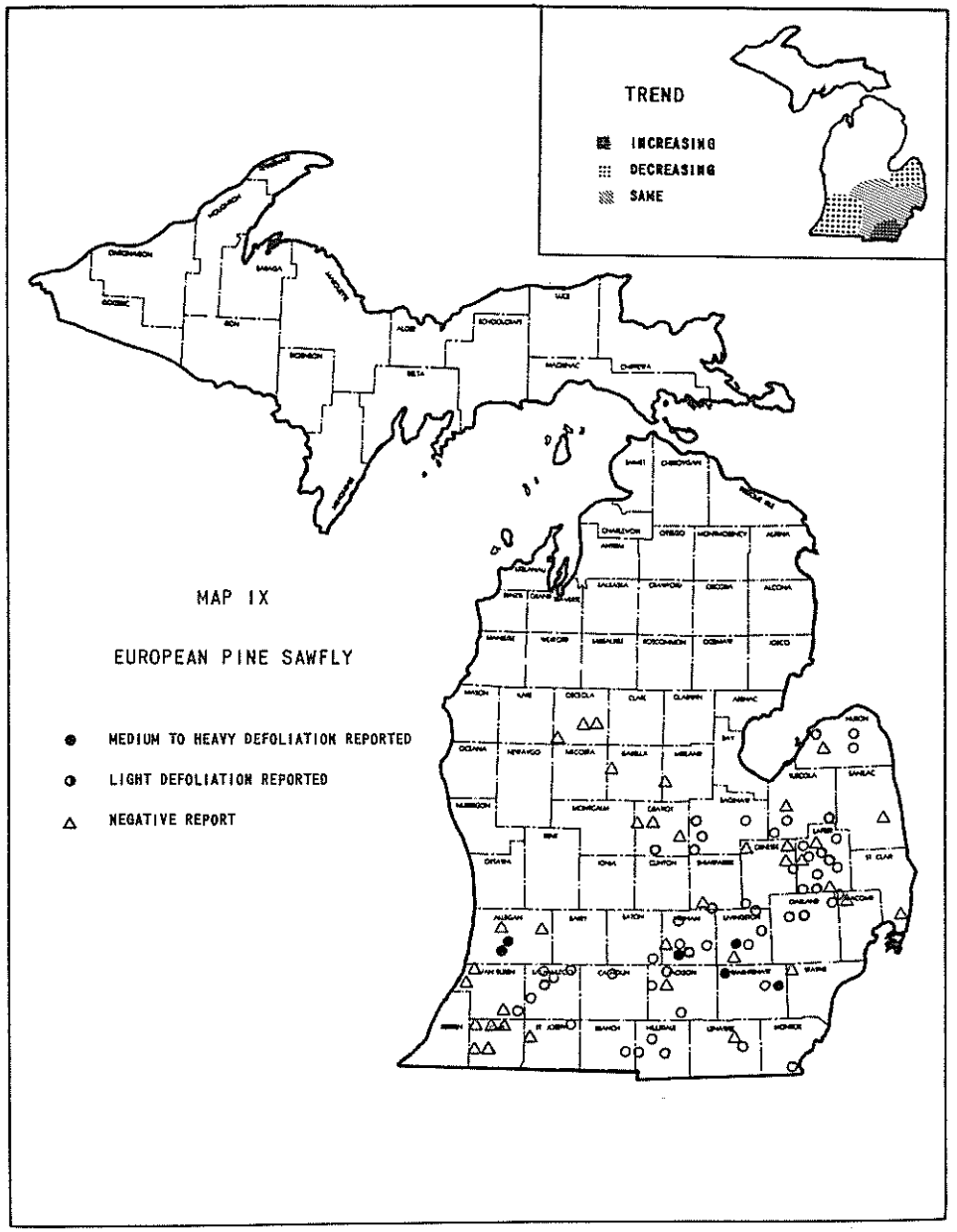
The anomala beetle has not been found in the Upper Peninsula or in the southern third of Lower Michigan. In the areas where it does exist, there is a considerable variation in the defoliation in adjacent plantations, with some plantations noticeably defoliated and others with no apparent damage. Tree mortality does not occur following even heavy defoliation, although there is probably some growth loss.

Summary of Reports

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Total.....	181	236	278	275	271	269	243	239	140	203	178	144	144
% Positive...	36	32	38	38	37	22	14	14	29*	28	31	25	19

*The apparent increase in percent of poisitive reports is due to the dropping of observations for this insect in the U.P. where it has never been found.


TREND
INCREASING
DECREASING
SAME
MAP VIII
LARCH SAWFLY
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT


TREND
INCREASING
DECREASING
SAME
MAP IX
EUROPEAN PINE SAWFLY
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT

Breakdown of 1964 Reports - Anomala Beetle

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-60%).....0.....(0%)
Light defoliation (1-20%).....27.....(100%)

LARCH SAWFLY - Pristiphora erichsonii (Htg.)

A continued decline of the larch sawfly defoliation was noticeable in the western Upper Peninsula, with many stands showing little or no noticeable defoliation. After two years of reduced activity in the eastern Upper Peninsula, an increase in defoliation occurred in 1964. Scattered tree mortality has occurred in some stands in the Upper Peninsula and up to 50 percent mortality has been reported in a few stands. Generally, however, tree mortality has not been high.

In northern Lower Michigan populations remained at about the same moderate level as in the past two years.

Throughout the entire area, defoliation varies considerably from tree to tree and stand to stand, with the same stands not necessarily suffering heavy defoliation in successive years.

Reports from the observation areas showed a decrease in the number of positive reports, but an increase in the severity of defoliation on some areas. (See Map VIII.)

Summary of Reports

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Total.....	113	137	135	145	140	133	131	118	116	130	119	119	107
% Positive...	30*	42	73*	66	81	85	95	97	99	99	96	98	89

*The apparent increase is largely due to intensified surveys rather than build-up of insect populations

Breakdown of 1964 Reports

Heavy defoliation (61-100%).....21.....(22%)
Medium defoliation (21-60%).....39.....(41%)
Light defoliation (1-20%).....35.....(37%)

EUROPEAN PINE SAWFLY - Neodiprion sertifer (Geoff.)

Although lower than in 1963, high level populations of the European pine sawfly continued in 1964 with moderate to heavy defoliation reported in most counties in the southern third of Lower Michigan. Most of these reports were other than on observation areas. Reports from observations indicated moderate to heavy defoliation in Livingston, Ingham, Washtenaw and Branch counties. (See Map IX.)

Many of the plantations in the southern portion of the state are sprayed with insecticides, thereby helping to keep this sawfly from causing more serious defoliation. No tree mortality has been reported as being caused by the European pine sawfly.

Summary of Reports

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Total.....	64	85	82	111	100	104	91	97	89	96	87	98	103
% Positive...	69	74	75	74	62	56	59	48	57	61	67	60	56

Breakdown of 1964 Reports

Heavy defoliation* .....3.....(5%)
Medium defoliation*.....2.....(3%)
Light defoliation* .....53.....(92%)

*Degree of defoliation = "D" =

$$\frac{\text{\% of susceptibel trees attacked} \times \text{\% of defoliation}}{100}$$

Heavy if "D" is greater than 24
Medium if "D" is between 9 and 24
Light if "D" is less than 9

FOREST TENT CATERPILLAR - Malacosoma disstria Hbn.

Several years ago there was a noticeable increase in the number of forest tent caterpillars found in aspen and maple stands in northern Michigan. Fortunately, the build-up did not continue in 1963, apparently due to late spring frosts.

Although a few caterpillars were observed in 1964, there is no evidence of other than an endemic population. No special surveys are planned for 1965.

Summary of Reports

	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Total.....	117	120	111	114	109	119	113	130	109	120	106
% Positive...	23	17	5	4	0	3	3	2	5	3	2

Breakdown of 1964 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-60%).....0.....(0%)
Light defoliation (1-20%).....2.....(100%)

* * *

OTHER IMPORTANT INSECTS

GYPSY MOTH - Porthetria dispar (L.)

The following information on the gypsy moth was received from the Plant Industry Division of the Michigan Department of Agriculture.

During the past summer, the Gypsy moth trapping survey was conducted in a 548 square mile area in the central Michigan counties of Ionia, Clinton and Shiawassee. The area comprises approximately the north one-third of the total area where infestations have been found in past years.

Ten seasonal trap tenders were employed, five with state funds and five with federal funds.

Two thousand, nine hundred sixty-three traps were placed in the three counties, with 2,234 in Clinton County, 210 in Ionia County and 519 in Shiawassee County. The traps were placed in woodlots and heavy fence rows, with an attempt made to place six traps per square mile.

The results of the trapping survey were again negative for the third consecutive year. The plan inaugurated in 1962 called for dividing the total known area of infestations into three parts, with a third to be surveyed each year.

Plans for 1965 call for a trapping survey to be made of the entire area. This, of course, would involve additional manpower, so a great deal depends on appropriations allotted the program. If this survey is made and the results are negative, it will be assumed that this serious pest has been eradicated.

WHITE GRUBS - Phyllophaga spp.

Chemical control projects, including white grub control, on state land were at the lowest level in many years. During 1964, only 1,345,905 trees planted on 1,638 acres were treated, as compared to over four and one-half million trees in 1963. With the reduction in State Forest planting, it is expected that amount of treated trees will continue to drop.

Past, untreated plantations in some parts of the state have been almost complete failures due to destruction of the roots by white grubs. Only by spraying the roots as the trees are planted can the trees be protected. The sprayer is attached to the planting machine and the roots and soil immediately surrounding the roots are sprayed with a ½-percent aldrin solution. In this way, the insecticide is placed only where needed and not spread elsewhere.

Plantings on the following forests were treated during 1964:

	Acres	Trees Treated
Lake Superior	265	190,470
Manistique River	196	167,260
Michigamme	218	218,000
Grand Sable	691	598,075
Mackinac	268	172,100

The U. S. Forest Service reported that white grubs were the most serious pest on the Hiawatha National Forest during 1964. Losses due to white grub feeding of over 50 percent of the seedlings in some new plantations were common.

PINE ROOT COLLAR WEEVIL - Hylobius radicis Buch.

Tree mortality, caused by the pine root collar weevil, continues to increase in Michigan, particularly in northwestern Lower Michigan. The major problem areas are Scotch pine, jack pine, or mixed jack and red pine plantations. Natural stands or pure red pine plantations are not seriously affected. Many Scotch pine plantations, which have grown past Christmas tree size and are left with the expectation of producing pulpwood, will be seriously decimated by the root collar weevil and may not produce a merchantable crop.

Research projects by Michigan State University and the Lake States Forest Experiment Station are aimed at discovering the ecological aspects of the weevil, in hopes of determining control methods other than chemical means.

CANKERWORMS

Cankerworms were in outbreak condition in many areas of Michigan. In the forested sections they caused little concern. However, they became a major problem to many urban people when they defoliated oaks and elms and then dropped on cars, houses, etc. in East Lansing, Ypsilanti and other municipalities. (See Fig. 3.)

Figure 3.

Cankerworms were numerous in several Lower Michigan communities, causing much concern but little damage.

EASTERN TENT CATERPILLAR - Malacosoma americana (F.)

After three years of high populations, a drastic decline occurred in 1964. In northern Lower Michigan the decline started in 1963, and by 1964, the webs were conspicuous by their absence.

WALKINGSTICK - Diapheromera femorata (Say)

A steady decline in walkingstick defoliation has taken place, with over 40,000 acres defoliated in Ogemaw County in 1956, 13,000 acres in 1960, 800 acres in 1962, and no noticeable defoliation in 1964. The insects were easily found, but were not abundant enough to cause signifcant defoliation. The same situation occurred in Dickinson County in the Upper Peninsula, on the Huron National Park, and in Wisconsin.

The eggs of the walkingstick require two years to hatch and defoliation is only during the even-numbered years in the outbreak areas in Michigan.

RED PINE SAWFLY - Neodiprion nanulus nanulus Schedl

The Lower Michigan National Forests reported that many red pine sawfly larvae were observed during June, probably indicating a build-up in populations.

ASPEN LEAF ROLLERS

Several species of aspen leaf rollers defoliated aspen in north central Lower Michigan and eastern Upper Peninsula, causing the trees to remain with thin crowns throughout the growing season.

SPRUCE BUDWORM - Choristoneura fumiferana (Clem.)

There were no reports of spruce budworm defoliation received.

OTHER INSECTS

Widely scattered colonies of the jack pine sawfly and yellow-headed spruce sawfly were reported. Pine tortoise scales could be found on many jack pine trees, but no serious outbreaks occurred.

* * *

OAK WILT - Ceratocystis fagacearum (Bretz) Hunt

The following information on the oak wilt situation in Michigan is a summary prepared by the Division of Plant Industry, Michigan Department of Agriculture:

In 1964, oak wilt disease survey and control was carried out in the same manner as in previous years. Conservation Department aircraft and pilots were used for survey work, with Plant Industry personnel acting as observers. A total of nine counties were surveyed this year. Counties surveyed in 1963 and resurveyed in 1964 included Barry, Cass, Kalamazoo, St. Joseph, and Van Buren. Counties surveyd for the first time in several years included Allegan, Eaton, Jackson, and Kent. The plan is to resurvey counties which have not been surveyed for several years. (See Map X.)

In 1964, the number of locations increased to 21 from the total of 14 recorded in 1963. The number of infected trees increased from 23 to 110. Due to the difficulties encountered in isolating the oak wilt fungus, trees are treated on the basis of visual symptoms. It is felt that many of the trees which were treated were actually dying as a result of the drought which has been prevalent for several years. Close observation is planned for several areas this next year, and it should be possible to tell if oak wilt is actually on the increase, or that the tree mortality is actually a result of drought conditions.

WHITE PINE BLISTER RUST - Cronartium ribicola Fischer

Blister rust control on state and private lands is coordinated and directed by the Michigan Department of Agriculture under a cooperative agreement with the U. S. Forest Service. A complete report of the project is published by the Michigan Department of Agriculture. Following is a summary of the report:

During 1964 a net total of 20,724 acres of white pine were surveyed. This entailed the covering of 44,710 acres of control area.

Ribes eradication was conducted from late April into October. Three inmate crews and five civilian crews were used on this work, and 16,604 acres of white pine received protection by the destruction of 522,058 ribes on 34,127 acres of control area. A total of 4,200 man-days of labor were expended to accomplish this.

Pruning to protect white pines from blister rust was initiated on an operational basis in 1964. Research has found that over 90% of the fatal infections occur in the basal portions of the trees, so the removal of lower live branches will effectively give protection to trees large enough to prune. The Forestry Section of the Michigan Department of Conservation cooperated with the Plant Industry Division of the Michigan Department of Agriculture in making this a joint pathological-silvicultural treatment. A total of 21,473 white pine trees were pruned on 295 acres of State Forest lands.

It is the feeling of the Michigan Department of Agriculture that Blister Rust Control should be considered as a part of total white pine management, and

not the beginning and end. Industry support for this program in the Lake States has been and still is almost entirely lacking. The potential for a sizeable forest industry based on Eastern White Pine is very great, but forest landowners and managers must be the first to grasp this and move toward a management program if any lasting progress is to be made. Research into existing problems will be made if the demand is great enough.

DUTCH ELM DISEASE - Ceratocystis ulmi (Buism.) C. Moreau

The Michigan Department of Agriculture, Plant Industry Division, coordinates a cooperative program of survey and control, working with the local units of government. Assistance is provided to municipalities in surveying for diseased, dead and dying elm trees and piles of elm wood in control areas. In addition, the Plant Industry Division issues and enforces condemnation orders for the destruction of such sources of disease innoculum and of the insect vectors, and operates a disease identification laboratory. The responsibility for spraying and sanitation for control of the elm bark beetles is placed on the individual communities and landowners.

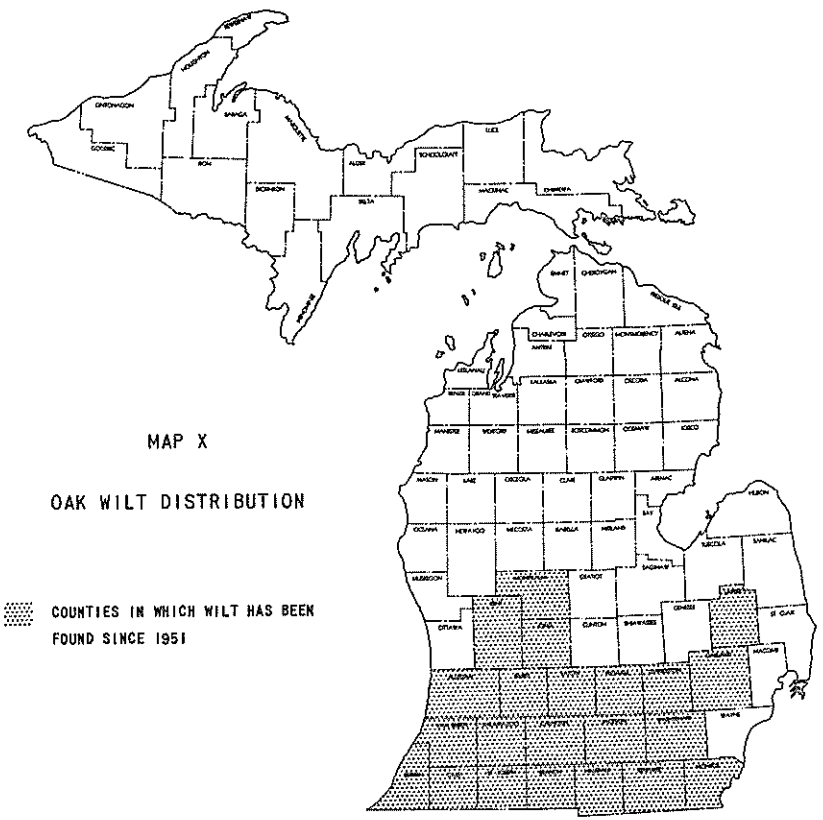
A complete report on the 1964 Dutch Elm Disease Program in Michigan has been prepared by the Michigan Department of Agriculture and is briefly summarized as follows:

The area of Michigan affected by Dutch elm disease remained essentially the same in 1964 as in 1963. It was found for the first time in Alpena. (See Map XI) Control efforts are primarily confined to urban areas where the high value of the trees justifies control expense. Other areas of control include park areas where trees are essential. In 1964, 83 communities participated in the control program. The program has now been stabilized to the point where participating communities are genuinely interested in Dutch elm disease control. The Laboratory processed a total of 11,994 elm samples in 1964, of which 9,226 were from private property, and 2,768 were from public. A total of 10,654 were found to be positive, and 1,340 were found to be negative.

Sanitation as well as spray is an important part of control. Department of Agriculture employees condemned 17,079 dead trees and 535 wood piles containing elm wood in 1964 in the interest of sanitation.

ANNOSUS ROOT ROT - Fomes annosus (Fr.) Cke.

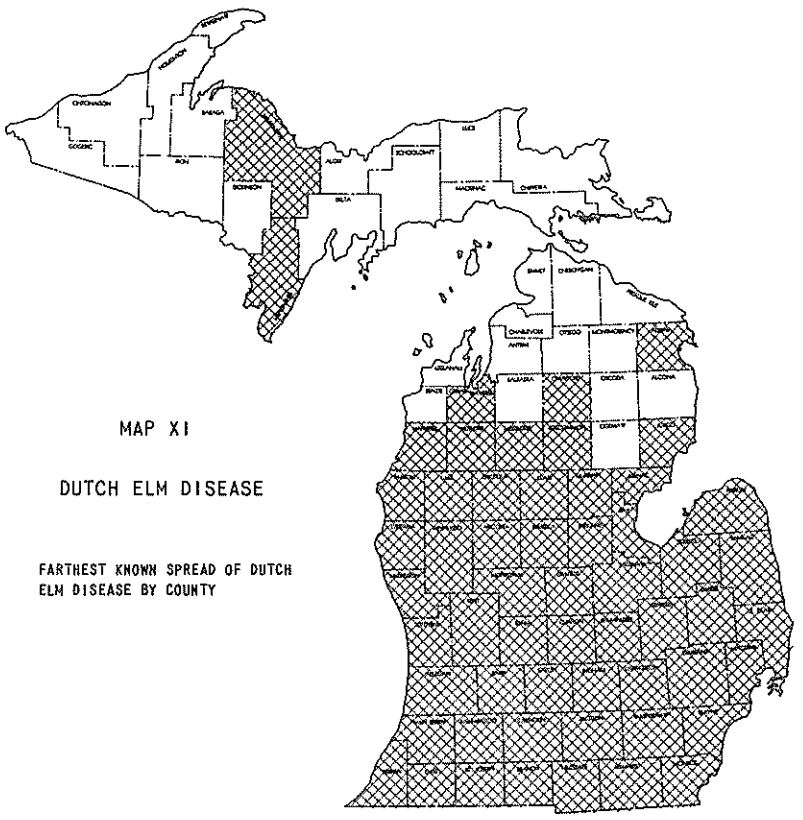
Annosus root rot, a very serious problem in the eastern and southern states, is now known to be killing trees in three places in Michigan. It was first discovered in 1961 at the University of Michigan's Saginaw Forest in Washtenaw County, where Norway spruce, Austrian pine, Scotch pine, Ponderosa pine and wild black cherry trees were killed. In 1963, red and Scotch pines were found to be infected at Michigan State University's Kellogg Forest in Kalamazoo County. The most recently discovered infection was in 1964 when 50 red and jack pine trees had died in the Proud Lake Recreation Area in Oakland County. All of these infections are in thinned plantations growing on former agricultural land.



MAP X

OAK WILT DISTRIBUTION

COUNTIES IN WHICH WILT HAS BEEN FOUND SINCE 1951



MAP XI

DUTCH ELM DISEASE

FARTHEST KNOWN SPREAD OF DUTCH ELM DISEASE BY COUNTY

EASTERN GALL RUST - Cronartium cerebrm Hedgc. & Long

The eastern gall or pine-oak rust causes great losses to young jack pine, both natural and planted. It is probably the most serious disease of young jack pine, yet no control is known other than in the nursery.

SHOESTRING ROOT ROT - Armillarea mellea Fr.

An increasing number of reports were received of trees dying due to shoestring root rot infection. The severe drought conditions prevailing in many areas of the state, and the breaking of roots due to high winds, are probably major contributing factors to the increase of infection and tree mortality. (See Figure 4.)

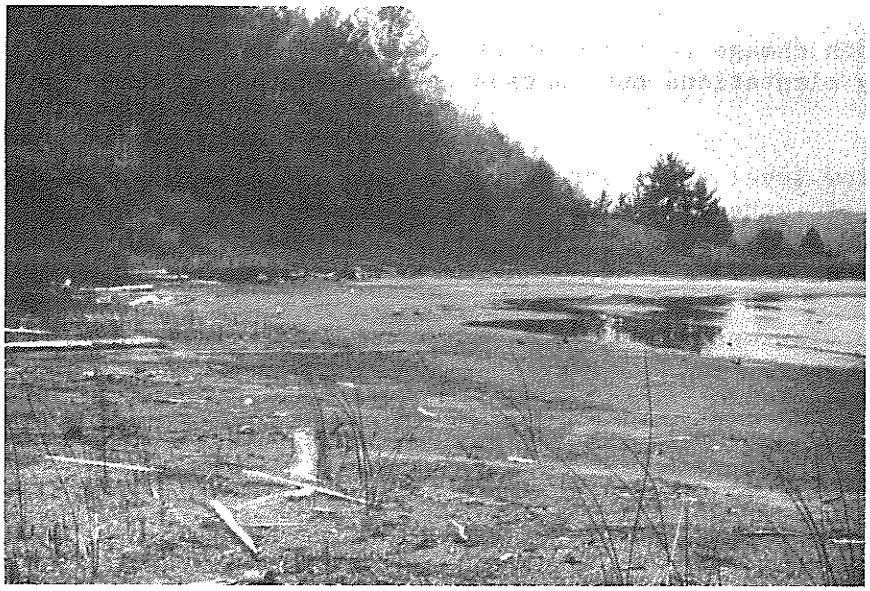


Figure 4.

Lower water levels in many sections of Michigan have resulted in reduced tree vigor.

* * *

OTHER CONDITIONS

Weather plays an important part in the health and growth of trees. Severe weather can be detrimental in many ways, killing new growth, mechanical damage to branches and roots, lack of essential moisture.

Severe frost killed leaves on oak and other species throughout most of northern Lower Michigan during the spring. Throughout the state the new growth on spruce and balsam was frosted in late May and early June.

Tornadoes and high winds blew down trees in Grand Traverse, Montmorency, Kalkaska, Crawford and other counties. Many of the trees not blown over suffered root damage and the effects of this may not be evident for many years.

* * *

SUMMARY

Widespread defoliation of jack pine by the jack pine budworm occurred in 1964 in north central and northeastern Lower Michigan. The outbreak covered a larger area than the previous year, although the trees were less severely defoliated. Some tree mortality occurred following the 1963 infestation. No reports of budworm defoliation were received from the Upper Peninsula.

Deformity caused by white pine weevil of jack, white, Scotch and red pines, as well as Norway spruce, continues to be a perennial problem throughout most of Michigan. Populations in northern Lower Michigan build-up to a high level and continue at that level while plantations in the Upper Peninsula are attacked to a lesser extent. Control on state lands was accomplished on 479 acres using crews with back-pack sprayers.

European pine shoot moth damage remained at the low level reached in 1963. The insect persists in many plantations but is causing much less damage than in previous years.

After remaining at a low level for several years, the red-headed pine sawfly is beginning to show signs of increasing activity. Approximately 300 acres of infested jack pine plantation were found in Iosco and Alcona counties. No spraying was necessary during 1964 on state land.

Saratoga spittlebug populations, in general, declined slightly from the low levels of the previous two years.

Anomala beetles continued to decline and caused less defoliation in northern Lower Michigan than in 1963 or 1962.

A continued decline of the larch sawfly was noticeable in the western section of the Upper Peninsula, with many stands showing little or no noticeable defoliation. After two years of reduced activity in the eastern Upper Peninsula, an increase in feeding occurred.

Although lower than in 1963, high level populations of the European pine sawfly continued in the southern third of Lower Michigan. Moderate to heavy feeding was reported in most counties in that area.

Forest tent caterpillar activity remained at a low level.

For the third year in a row the Michigan Department of Agriculture gypsy moth trapping program failed to reveal any male moths and therefore no spraying is planned for 1965. If the 1965 trapping is negative, the pest will be considered to have been erradicated from Michigan.

The pine root collar weevil seriously damaged Scotch, red and jack pine plantations in northern Lower Michigan. It is present elsewhere but causing less damage.

The largest control program on state land was directed towards preventing the feeding of white grubs on newly planted seedlings. The seedlings planted on 1,638 acres were sprayed with aldrin as they were planted to protect them.

Cankerworms, sawflies, aspen leaf rollers and other insects caused damage or defoliation of local concern.

Nine counties were aerially surveyed for oak wilt infections. An increase in number of disease locations and infected trees were found.

Dutch elm disease continues to spread northwards in the state and was found for the first time in Alpena County in 1964. In addition, it is present in Menominee and Marquette counties in the Upper Peninsula.

The white pine blister rust control program continued in Michigan, with 16,604 acres of white pine given protection by erradicating ribes plants on 34,127 acres of control area.

* * *